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NATURAL HYBRIDS IN SPIRANTHES AND HABENARIA.

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(Plate 47.)

AN interesting natural hybrid derived from *Spiranthes gracilis*, Bigelow, and *S. praecox*, Watson, was detected recently in Easton, Massachusetts, growing in close proximity to the parent species in an open dry field. A single specimen, together with several specimens of *S. praecox*, was collected on September 3, 1903, by A. A. Eaton, who, though he suspected the origin of the odd specimen, sent it without comment to the writer. So it happened that independently of each other two people arrived at similar conclusions. A second and third trip to the same locality brought to light a dozen specimens, all quite intermediate in character and distinctly hybrid. The resemblance between these hybrids and one parent or the other would readily mislead a collector whose interests were not specially concerned with this particular group of orchids, and it would not be strange if such hybrids have been grouped arbitrarily with *Spiranthes praecox* or *S. gracilis*. To obtain the relatively few plants, which have been studied for the preparation of this note, a large area was searched and the material collected carefully examined.

The *Spiranthes gracilis* which should be regarded as a parent of the hybrids in question is the typical New England form, which blooms in late summer and early autumn. Likewise the *S. praecox*, with which we are concerned, is the New England form which usually completes its season of bloom by the end of the second week in September. These remarks may seem quite commonplace, but they are

made because of the seasonal differences in anthesis in several of the *Spiranthes* species in their northern and southern habitats, and because of segregates from *S. praecox*, which have been described recently.

Although the range of variation in most of our *Spiranthes* is astonishingly extensive, it would be difficult to account for the peculiarities of the Easton plants on any supposition other than hybridity. Some among these were much like *S. gracilis*, but the leaves, the pubescence, and the narrow hyaline margins of the floral bracts were decidedly similar to *S. praecox*. Of the plants resembling *S. praecox* in their inflorescence the broad, elliptic-lanceolate leaves and the green callosities near the base of the oblong lip were conclusive evidence of an unusual origin and constitution.

The leaves of the hybrids varied in form and in dimensions; they rarely attained the average length of *S. praecox* leaves, and were not as short as those of *S. gracilis*. However, they proved to be intermediate in varying degrees.

The pubescence of the scape, rhachis and capsules was distributed much in the same way as in *S. praecox*, but was decidedly shorter, less dense, and in some forms quite obscure. In fact the tendency toward glabry in one parent and the tendency toward pubescence in the other produced a mean in the hybrids, an interesting consideration when contrasted with the dominant and recessive characters peculiar to Mendelian race-hybrids.

Several specimens with a distinctively *S. gracilis* aspect produced flowers which never expanded, and in one specimen which resembled *S. praecox* the same tendency, though less marked, was noted.

The flowers were variable in length, but for the most part intermediate in this respect. They were not so white as in *S. gracilis* nor so yellow as in the typical *S. praecox* of the region where the hybrids were found. The coloring of the lip was distinctive; yellow-green at the apical, greenish near the proximal end; the callosities or nipples were green at their base with a whitish apex. As far as observed the color of the callosities was decisive in the determination of the hybrids.

SPIRANTHES × **intermedia**, hyb. nov. Plants 27–42 cm. tall, slender; tubers about 7 cm. long, 6 mm. thick near the base; leaves lance-linear or elliptic-lanceolate, 4.5–8.5 cm. long, 8–15 mm. wide, passing into slender petioles; cauline bracts lance-linear, pointed; scape pubescent above, pubescence short, rather dense or sometimes

obscure; rhachis 6–16 cm. long; floral bracts ovate-lanceolate, abruptly acuminate, longer than the ovaries, with a faint hyaline margin; flowers 6–7 mm. long, in a spiral or one-sided spicate raceme; lateral sepals deflexed, lanceolate, margins involute, upper sepal oblong, obtuse, all the sepals sparsely pubescent; petals oblong, obtuse, tapering slightly to the base, equalling in length the upper sepal, and connivent with it; lip oblong, somewhat flaring at the strongly deflexed apex, green, or yellowish toward the proximal end, with a broad, whitish, erose margin; callosities green with a whitish or yellowish apex, partially pubescent. In dry upland fields, Easton, Bristol County, Massachusetts, Sept. 3, 8, 10, 1903. (*A. A. Eaton*).

Spiranthes × *intermedia* is a non-Mendelian hybrid. It is intermediate throughout, the characters of both parents being merged in all the important vegetative and floral parts. The capsules produce good seeds with plump embryos, and there is no reason to infer that the pollen has been impaired in efficacy through the influences of hybridization. The probabilities are, if horticultural experience with orchids is to count, that *S.* × *intermedia* can reproduce itself from seeds provided pollination and subsequent fertilization are effected by kindred pollen; and that the plants will act as species in their development. In fact, if seeds should germinate in a locality far enough removed from the parent species to make future pollination from them an exception rather than the rule, it would be rational to suppose that the hybrids would develop rapidly into a localized species. The plants increase by means of offshoots, and even when mingled with *S. praecox* and *S. gracilis* would survive long enough to ensure, through the laws of chance, an occasional successful cross with another hybrid, — a process which would tend to increase their number and so render more likely their perpetuation by seed.

The scattered occurrence of the hybrids forms the basis for the belief that more than one cross has been effected in the region of Easton. Furthermore, it is interesting to note that secondary hybrids may be represented by several ambiguous forms of *S. praecox* concerning which it has been thought best to withhold an opinion at this time.

In RHODORA (iii. 245) Mr. A. LeRoy Andrews described an odd form of *Habenaria* as a natural hybrid from *H. psycodes* and *H. lacera*. His specimens were collected in a wet meadow in Pownal, Vermont, on July 22, 1898, and on August 5, 1901. Mr.

Andrews sent to the writer a single specimen, which was collected on Aug. 5, 1902. This had more the appearance of *H. lacera* than of *H. psycodes*, but showed unmistakable evidences of hybrid origin. About a year ago, among specimens from the herbarium of Mr. John A. Wheeler, the writer found a single example of this hybrid, provisionally determined as *H. psycodes*, which Miss L. O. Eaton collected in South Chesterville, Maine. The flowers were quite intermediate in character, the petals and the deeply lacerate lip being indicative of the influences contributed by *H. lacera*. The plant has no date of collection, but it is interesting to note the fact that *H. psycodes* × *lacera* has been found in Maine.

Natural hybrids do not seem to be common among New England orchids, but intensive study may bring more to light. Often the characters which designate hybridity are extremely elusive, and hybrids are classed arbitrarily with the species to which they bear the closest resemblance. As a general rule orchids which hybridize freely give rise to progeny of an intermediate character, but when specific lines are closely drawn, and based on traits phylogenetically young, parental differences may not stand out with sufficient distinctness to attract special attention and so hybrids may well be overlooked.

How far the principles laid down by Gregor Mendel apply to *Orchidaceae* can not be stated with surety, but among the generally cultivated exotic species non-Mendelian hybrids seem to prevail. However, among such variable species as *Habenaria hyperborea*, from which questionable segregations have been made it may be probable that race-hybrids play an important part. Many of the *H. hyperborea* segregates are based on very slight variations in the vegetative and floral organs, on the relative proportions of the lip and spur, and on differences which can not be regarded as constant enough for critical determination. That these characters are of slight varietal value and perhaps merely racial, may explain away some of Dr. P. A. Rydberg's recently described species as simple Mendelian race-hybrids and their derivatives, which illustrate the remarkable peculiarities of recession and dominance and the redistribution of traits.

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EXPLANATION OF PLATE 47.—Two forms of *Spiranthes* × *intermedia*, *hyb. nov.* Fig. 1, lip of *S. gracilis*, Big. (× 3); Fig. 2, of *S.* × *intermedia* (× 3); Fig. 3, of *S. praecox*, Wats. (× 3.)